



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/649,282 | 08/27/2003 | Guo Liu | SMBZ 2 01002 | 5488 |
| 27885 | 7590 | 08/24/2005 | EXAMINER | |
| FAY, SHARPE, FAGAN, MINNICH & MCKEE, LLP 1100 SUPERIOR AVENUE, SEVENTH FLOOR CLEVELAND, OH 44114 | | | THOMPSON, CAMIE S | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1774 | |
| DATE MAILED: 08/24/2005 | | | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/649,282 | LIU ET AL. | |
| | Examiner | Art Unit | |
| | Camie S. Thompson | 1774 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Election filed June 13, 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) 32-41 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21-31 and 42-44 is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>4/10/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's election of Group I, claims 1-31 and 42-44 is acknowledged.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 10-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 10 is rendered indefinite because it is unclear if the claim is directed to the improved phosphor or the electroluminescent device comprising the improved phosphor. Claim 10 is dependent upon claim 1, which is drawn to an improved phosphor.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 1774

5. Claims 1-4, 6 and 8-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Hampden-Smith et al., U.S. Patent Number 5,837,320.

The reference discloses ZnS thin films that have a sphalerite crystal structure (see column 17, lines 44-54). Additionally, the reference discloses that the typical films have a grain size around 60-100 nm as per instant claims 2 and 3. Also, Hampden-Smith discloses that the ZnS phosphor can be doped with europium or terbium as per instant claims 1 and 4 (see reference claims 1, 18 and 20). It is disclosed in the reference that zinc sulfide is deposited by chemical vapour deposition (see entire document).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hampden-Smith et al., U.S. Patent Number 5,837,320.

The reference discloses ZnS thin films that have a sphalerite crystal structure (see column 17, lines 44-54). Additionally, the reference discloses that the typical films have a grain size around 60-100 nm as per instant claims 2 and 3. Also, Hampden-Smith discloses that the ZnS phosphor can be doped with europium or terbium as per instant claims 1 and 4 (see reference claims 1, 18 and 20). It is disclosed in the reference that zinc sulfide is deposited by chemical vapour deposition (see entire document). The reference does not disclose the thickness of the film of

Art Unit: 1774

about 0.5 to about 1.0 μm . However, the reference does disclose that the ZnS film is deposited at a rate of 100-150 /min. Therefore, it would have been obvious to one of ordinary skill in the art to have a film thickness of about 0.5 to about 1.0 μm in order to have a homogeneous film.

Double Patenting

8. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

9. Claims 1-6, 8-10 and 12 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1, 14-16 and 23 of copending Application No. 10736,320. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented. Both applications recite an improved phosphor film for a thick film electroluminescent

Art Unit: 1774

display, wherein said phosphor film is a rare earth activated fine-grained zinc sulfide wherein the rare earth is terbium or europium. Additionally, both applications recite that the phosphor has a crystal grain dimension of up to 50 nm and the atomic ratio for terbium or europium to zinc is about 0.005 to 0.02. Also, both applications recite that the phosphor has a sphalerite crystal structure. It is recited by both applications that an aluminum nitride barrier layer is on top and/or bottom side of the phosphor film wherein the aluminum nitride barrier acts as an interface and improves the stability of the interface between the phosphor film and the device.

10. Claims 21-31 and 42-44 are allowed. The prior art does not provide for a thick film dielectric electroluminescent device comprising:

- a thin phosphor layer of formula ZnS:Re , wherein said phosphor layer has a crystal grain size of up to about 50 nm and Re is selected from terbium and europium; and
- a structure and/or substance to minimize or prevent reaction of the fine grained phosphor with oxygen, wherein said structure or substance comprises one or more of,
 - i) interface modifying layers on one or both sides of the phosphor film to improve the stability of the interface between the phosphor and the rest of the device;
 - ii) a hermetic enclosure for the electroluminescent device; and
 - iii) an oxygen getter incorporated into the device.

Additionally, the prior art does not provide for a thick film dielectric electroluminescent device comprising:

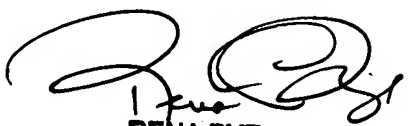
A 0.5 to 1.0 μm thick phosphor layer of formula ZnS:Re , wherein said phosphor layer has a sphalerite crystal structure with a crystal grain size of up to about 50 nm and Re is selected from terbium or europium; and

Art Unit: 1774

i) interface modifying layers on one or both sides of the phosphor film to improve the stability of the interface between the phosphor film and the rest of the device, wherein said interface modifying layers are comprised of pure zinc sulfide or silicon nitride.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Camie S. Thompson whose telephone number is (571) 272-1530. The examiner can normally be reached on Monday through Friday from 7:30 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rena L Dye, can be reached at (571) 272-3186. The fax phone number for the Group is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


RENA DYE
SUPERVISORY PATENT EXAMINER
A.U. 1774 8/18/08